

# **“High Reliability High Mix, Ultralow Volume Surface Mount Technology for Space Applications”**

by

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**ABSTRACT:** SMT needs for space applications can best be characterized as ultralow volume surface mount PWAS. Ultralow volume production of high reliability SMAS poses a unique set of challenges. Several research and development efforts are being conducted in a concurrent engineering fashion to develop standards and guidelines for usage of SMAS in space. The following areas are being investigated and developed:

Quality assurance methodology for SMT. Identify the critical parameters of SMT manufacture and determine the methods and tools required to integrate quality assurance procedures into the design and manufacturing processes so that the critical parameters may be bounded and controlled.

SMT solder joint integrity and reliability prediction. Develop a thorough understanding of creep-fatigue mechanisms underlying solder joint failures of surface mount electronic packaging systems and develop generic, broadly applicable design guidelines, analysis methodologies, and data requirements.

Qualification of SMT assemblies to meet flight hardware requirements. Develop assembly level qualification test and reliability assessment methodologies for surface mount technology. Apply these methodologies to electronic packaging systems through the use of experimental design techniques and phased experimentation.

NASA standards and guidelines set forth in a handbook for SMT design and fabrication. Develop a handbook from the knowledge gained from the JPL R&D efforts, as well as the efforts of other NASA centers, industry knowledge centers, and industry partners.

The above topics will be addressed as well as some of the problems peculiar to a high mix, ultralow volume line. Concerns relevant to high reliability SMT for space applications will be discussed.